



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,732	11/25/2003	Sheng-Lyang Jang	7257/71612	9806

7590 12/02/2005

Cooper & Dunham LLP  
1185 Avenue of the Americas  
New York, NY 10036

EXAMINER

KITOV, ZEEV

ART UNIT PAPER NUMBER

2836

DATE MAILED: 12/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/723,732

**Applicant(s)**

JANG ET AL.

**Examiner**

Zeev Kitov

**Art Unit**

2836

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 12 - 29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 12 - 29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

Examiner acknowledges a submission of the amendment and arguments filed on September 9, 2005. Claims 12, 21, and 29 are amended. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action.

#### ***Objection***

Applicant is advised that should claim 12 be found allowable, claim 29 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k). As a matter of fact claim 29 is an exact copy of claim 12.

#### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the switch control circuit connected between the positive (or negative) power supply node and the gate of the SCS as recited in Claims 12, 21 and 29 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate

Art Unit: 2836

prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 12, 21 and 29 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. A reason for that is that the claims include limitation of a switch control circuit connected between the positive (or negative)

power supply node and the gate of the SCS. According to the claims language the gate of the SCS is the base of the PNP transistor. The block diagram Fig. 1 shows the switch control circuit block (20 in Fig. 1) being connected between the positive supply node and the SCS, however none of the circuit diagrams (Fig. 2 – 6) demonstrate practical realization of such connection. Specification is silent with respect to details of such connection. For purpose of examination, patentable weight was not given to the recited connection.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 12 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Applicant Admitted Prior Art (AAPA). Regarding Claims 12 and 29, AAPA discloses following elements: a silicon controlled switch (PNP and NPN transistors in Fig. 9 of Specification) connected between a positive power supply node (V<sub>dd</sub> in Fig. 9) and a negative power supply node (V<sub>ss</sub> in Fig. 9), where the SCS is formed by an NPN transistor and a PNP transistor, wherein a base of the PNP transistor is connected to the positive power supply node through a resistor (upper resistor in Fig. 9) and is connected to a collector of the NPN transistor, a collector of the PNP transistor is connected to a base of the NPN transistor and further through a resistor (bottom resistor

in Fig. 9) to a ground terminal, where the base of the PNP transistor serves as a gate of the SCS; a switch control circuit (resistor and capacitor circuit on the left in Fig. 9); a metal oxide semiconductor field effect transistor (MOSFET) (element in parallel to NPN transistor in Fig. 9) having a drain and a source and a gate wherein the drain and the source of the MOSFET are respectively connected to the SCS and the ground terminal, and the gate of the MOSFET is coupled to a transistor control circuit wherein the MOSFET can cause the SCS to be triggered into a conduction status, and the transistor control circuit is connected between the positive power supply node and the MOSFET (through capacitor in Fig. 9), whereby when forward over-voltage stress occurs over the positive power supply node the transistor control circuit is enabled to turn on the MOSFET, and at the same time the switch control circuit is enabled to trigger the SCS into a conduction status to form a discharging path, such that a terminal voltage over the positive power supply node is decreased to a level of a holding voltage of the SCS to provide an ESD protection and prevent latch-up of the SCS (col. 6, line 42 – col. 7, line 9).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 13 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Metz et al. Claims 13 and 22 differ from Claims 12 and 29 rejected above by their limitation of the adjustable RC circuit. Regarding Claims 13 and 22, Metz et al. disclose the transistor control circuit formed by a capacitor connected to a resistor in series at a node (C and R in Fig. 4a), the node is connected to the gate of the MOSFET (18 in Fig. 4a). It further discloses setting the time constant of the transistor control circuit by adjusting values of the resistor to control a conduction time of the MOSFET (col. 6, line 59 – col. 7, line 9). Both references have the same problem solving area, namely providing ESD protection by using the SCR element. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the AAPA solution of by adding the adjustable RC circuit according to Metz et al., because as clear from Metz et al. statement (col. 6, line 59 – col. 7, line 9), the RC constant of the circuit is to be adjusted (optimized) in order to ensure (I) lack of the triggering when the device is powered up, and (II) certain activation (latching) of the SCS circuit.

Claims 14, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Avery (US 6,594,132). As per Claim 21, it differs from Claims 12 and 29 rejected above by its limitation of the MOSFET being connected between the positive supply node and the SCS. Avery discloses a silicon controlled switch (T1, T2 in Fig. 5G) connected in exact accordance with the claim language, the MOSFET connected between the positive supply node and the gate G2 of the SCS (202 in Fig. 5G). When forward over-voltage stress occurs over the positive power supply node the

Art Unit: 2836

transistor control circuit is enabled to turn on the MOSFET, and at the same time the switch control circuit is enabled to trigger the SCS into a conduction status to form a discharging path, such that a terminal voltage over the positive power supply node is decreased to a level of a holding voltage of the SCS to provide an ESD protection and prevent latch-up of the SCS (col. 1, line 55 – col. 2, line 36). Both references have the same problem solving area, namely providing an ESD protection by using the SCR (SCS). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified solution the AAPA solution by moving the FET into another position according to Fig. 5G of Avery, because as Avery demonstrated (see Fig. 5A – 5H), there is variety of versions of SCS being triggered by MOSFET; where the Fig. 5G is only one of them having some circuit topology advantages and some disadvantages. A selection of the particular solution depends on the designer convenience in a selection of the triggering source and its connection to one or another power supply lines.

As per Claims 14 and 23, they differ from Claim 12 rejected above by their limitation of presence of the zener diode between the bases of the SCS transistors. AAPA discloses the SCS having the zener diode (ZD in Fig. 11) connected between the bases of the PNP and NPN transistors. It further discloses that such SCS has advantage of a low trigger voltage ([0013] in Specification). Both references have the same problem solving area, namely providing the ESD protection by using the SCR circuits. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Avery et al. solution by adding the zener diode



Art Unit: 2836

between the bases of the SCS transistors according to AAPA, because as AAPA states ([0013] in Specification), it will provide the low trigger voltage, and therefore the SCS will be able to maintain itself in conduction state after the MOSFET is deactivated.

Claims 15, 18, 19 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant Admitted Prior Art (AAPA) in view of Avery and Mergens et al. (US 6,768,616). Claims 15 and 24 differ from Claims 14 and 23 rejected above by their limitation of having additional diode connected in series with the zener diode. AAPA discloses the SCS having the array of diodes (D1 – D4 in Fig 10) connected between the bases of the PNP and NPN transistors. It further discloses that such SCS has advantage of adjusting a specific value of the trigger voltage ([0013] in Specification). Both references have the same problem solving area, namely providing the ESD protection by using the SCR circuits. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified the AAPA solution by adding one or more diodes connected in series with the zener diode according to teaching of Mergens et al., because as Mergens et al. state (col. 5, lines 19 – 34, col. 7, lines 9 – 45), arrangements of forward biased diodes makes possible setting a precise value of the triggering voltage and additionally, the SCS will be able to maintain itself in conduction state after the MOSFET is deactivated.

As per Claims 18 and 19, they differ from Claims 14 and 15 rejected above by their limitation of the diodes array connected between the SCS and the ground terminal. Mergens et al. discloses the SCS (shown in Fig. 3 – 20). It further discloses the

Art Unit: 2836

schematic diagram of a temperature compensation of the trigger device connected to the ground terminal through the series of diodes (320 in Fig. 26, col. 17, line 54 – col. 18, line 24). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the AAPA solution by adding the series connected diode array between the SCS and the ground, because as Mergens et al. demonstrated, (I) such diodes will improve the temperature stability of the triggering threshold (col. 17, line 54, col. 18, line 24), and (II) since according to Mergens et al., the triggering threshold can be set by arrangement of the threshold devices, such as diodes between the bases of the SCS transistors (see Fig. 7), in such case the temperature compensating array of diodes should be connected between the SCS and the ground terminal.

Claims 16, 17, 25 - 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Avery and Mergens et al. As per Claims 25 and 26 they differ from Claims 21 and 22 rejected above by its limitation of the SCS being connected to the power supply line through a diode array in series. Mergens et al. disclose the SCS (312 and 310 in Fig. 20) being triggered by capacitive coupling (2006n in Fig. 20) and being connected to the positive power supply line through the diode array (2008 in Fig. 20, col. 13, line 36 – col. 14, line 7). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the AAPA solution by adding the diode array in series according to Mergens et al., because

Art Unit: 2836

as Mergens et al. state (col.13, line 59 – col. 14, line 7), it will provide protection in a plural supply environment against ESD stressing a particular supply line.

Claims 16 and 17 differ from Claims 12 and 13 rejected above by its limitation of the SCS being connected to the ground terminal through a diode array in series. Mergens et al. discloses the SCS (shown in Fig. 3 – 20). It further discloses the schematic diagram of a temperature compensation of the trigger device connected to the ground terminal through the series of diodes (320 in Fig. 26, col. 17, line 54 – col. 18, line 24). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the AAPA solution by adding the series connected diode array between the SCS and the ground, because as Mergens et al. demonstrated, (I) such diodes will improve the temperature stability of the triggering threshold (col. 17, line 54, col. 18, line 24), and (II) since according to Mergens et al., the triggering threshold can be set by arrangement of the threshold devices, such as diodes between the bases of the SCS transistors (see Fig. 7), in such case the temperature compensating array of diodes should be connected between the SCS and the ground terminal.

As per Claims 27 and 28 they differ from Claims 23 and 24 rejected above by its limitation of the SCS being connected to the power supply line through a diode array in series. Mergens et al. disclose the SCS (312 and 310 in Fig. 20) being triggered by capacitive coupling (2006n in Fig. 20) and being connected to the positive power supply line through the diode array (2008 in Fig. 20, col. 13, line 36 – col. 14, line 7). It would have been obvious to one of ordinary skill in the art at the time the invention was made

Art Unit: 2836

to have modified the Avery et al. solution by adding the diode array in series according to Mergens et al., because as Mergens et al. state (col.13, line 59 – col. 14, line 7), it will provide protection in a plural supply environment against ESD stressing a particular supply line.

As per Claim 25 it differs from Claim 21 rejected above by its limitation of the SCS being connected to the power supply line through a diode array in series. Mergens et al. disclose the SCS (shown in Fig. 3 – 20). It further discloses the schematic diagram of a temperature compensation of the trigger device connected to the ground terminal through the series of diodes (320 in Fig. 26, col. 17, line 54 – col. 18, line 24).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the AAPA solution by adding the series connected diode array between the SCS and the ground, because as Mergens et al.

demonstrated, (I) such diodes will improve the temperature stability of the triggering threshold (col. 17, line 54, col. 18, line 24), and (II) since according to Mergens et al., the triggering threshold can be set by arrangement of the threshold devices, such as diodes between the bases of the SCS transistors (see Fig. 7), in such case the temperature compensating array of diodes should be connected between the SCS and the ground terminal.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Avery and Quigley (US 6,177,298). Claim 20 differs from Claim 12 rejected above by its limitation of presence of the NMOS transistor between the bases of the

Art Unit: 2836

SCS transistors. Quigley discloses triggering the SCS by the NMOS transistor (16 in Fig. 1) connected between the bases of the SCS transistors (12 and 13 in Fig. 1). Both references have the same problem solving area, namely providing ESD protection by using the SCR clamp. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the AAPA solution by connecting the triggering NMOS transistor between bases of the SCS transistor according to Quigley, because as Quigley states (col. 3, lines 35 – 56), such arrangement (I) has an advantage of the reaction speed higher than that of the involves breakdown effect devices, (II) simplicity of manufacturing, (III) easiness of integration and (IV) smaller parts count and therefore lower cost than the AAPA solution.

### ***Response to Arguments***

Applicant's Arguments have been given careful consideration but they are moot in view of new grounds of rejections.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

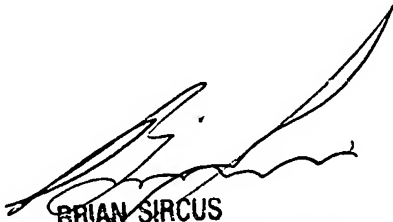
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

Art Unit: 2836

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zeev Kitov whose current telephone number is (571) 272 - 2052. The examiner can normally be reached on 8:00 – 4:30. If attempts to reach examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on (571) 272 – 2800, Ext. 36. The fax phone number for organization where this application or proceedings is assigned is (571) 273-8300 for all communications.

Z.K.  
11/27/2005

  
BRIAN SIRCUS  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800